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GEOGRAPHICAL NOTES,

BY

GEO. C. HURLBUT, *Librarian.*

THE PILOT CHARTS OF THE NORTH PACIFIC AND THE NORTH ATLANTIC OCEANS, for December, issued by the U. S. Hydrographic Office, note two remarkable changes in the deviation of the compass. In the first case a meteor passed close to the Br. Steamship *Nerano*, in latitude 49° 42′ N., longitude 13° 30′ W. A bearing of the North Star, taken soon after, showed that the deviation of the compass had changed from 5° 30′ West to 5° 30′ East. Subsequent observations indicated a gradual change to the old position, 5° 30′ West, 24 hours after the passage of the meteor.

The second instance was that of the Steamship *El Sol*, an iron vessel with iron masts. The foremast was struck by lightning, while near the Dry Tortugas, and the effect on the pilot-house compass, ten feet abaft the foremast, was to reverse its magnetism, the north point becoming the south; while the bridge compass, ten feet further aft, showed a change of from four to eight points. The other compasses, which were at greater distances from the foremast, also exhibited serious changes.

TOPOGRAPHICAL ATLAS OF THE UNITED STATES.—The following sheets of this atlas have been received from the U. S. Geological Survey:

California: Big Trees, Lodi, Marysville, scale 1 : 125,000.

Colorado: Aspen, special, scale 1 : 9,600; Castle Rock, Pike's Peak, scale 1 : 125,000.

Idaho: Idaho Basin, Nampa, Rocky Bar, Silver City, Squaw Creek, scale 1 : 125,000.

Kansas: Beloit, Ellsworth, Mankato, Pratt, scale 1 : 125,000; Sitka, scale 1 : 62,500.

Louisiana: Bayou de Large, Chandeleur, Dulac, Lake Felicity, Timbalier, scale 1 : 62,500.

Maine: Gray, Norridgewock, scale 1 : 62,500.

Montana: Fort Custer, Rosebud, Saint Xavier Mission, scale 1 : 125,000.

New York: Buffalo, Durham, Elizabethtown, Elizabethtown (Ausable), Kaaterskill (Durham), Niagara Falls, Niagara Falls and Vicinity, Port Henry (Willsboro), Wilson, scale 1 : 62,500.

North Dakota: Fullerton, Oakes, scale 1 : 62,500.

North Dakota—South Dakota: Ellendale, Hecla, scale 1 : 62,500.

Oregon: Ashland, scale 1 : 250,000.

Pennsylvania: Allentown, Bloomsburg, Shickshinny, Wilkesbarre, scale 1 : 62,500.

South Dakota: Conde, scale 1 : 62,500; Deadwood, Hermosa, scale 1 : 125,000.

Texas: Fort Hancock, Hamilton, Salt Basin, scale 1 : 125,000.

Vermont: Londonderry, scale 1 : 62,500.

Virginia: Bermuda Hundred, Petersburg, Richmond, scale 1 : 62,500.

Virginia — West Virginia: Pocahontas, scale 1 : 125,000.

Wisconsin: Portage, scale 1 : 62,500.

BULLETINS OF THE U. S. GEOLOGICAL SURVEY recently issued are:

No. 97. The Mesozoic Echinodermata of the United States. By William Bullock Clark.

No. 98. Flora of the Outlying Carboniferous Basins of Southwestern Wisconsin. By David White.

No. 99. Record of North American Geology for 1891. By Nelson Horatio Darton.

No. 100. Bibliography and Index of the Publications of the Geological Survey, with the Laws governing their Printing and Distribution. By Philip Creveling Warman.

No. 101. Insect Fauna of the Rhode Island Coal Field. By Samuel Hubbard Scudder.

No. 102. A Catalogue and Bibliography of North American Mesozoic Invertebrata. By Cornelius Breckinridge Boyle.

It is not satisfactory to read in the preface that, because of subsequent changes in State and Territorial boundaries, there may be difficulty in recognizing the localities mentioned unless Bulletin No. 13, in which these changes have been recorded, is at hand for reference. A few words added, in parenthesis, would have explained every such case.

No. 103. High Temperature Work in Igneous Fusion and Ebullition, chiefly in relation to Pressure. By Carl Barus.

No. 104. The Glaciation of the Yellowstone Valley North of the Park. By Walter Harvey Weed.

No. 105. The Laramie and the Overlying Livingston Formation in Montana. By Walter Harvey Weed, with Report on Flora by Frank Hall Knowlton.

No. 106. The Colorado Formation and Its Invertebrate Fauna. By Timothy W. Stanton.

The geological introduction gives the history and definition of the Colorado formation, and lists which show the vertical range and areal distribution of most of the species described. Thirty-nine of these are believed to be new to science.

No. 107. The Trap Dikes of the Lake Champlain Region. By James Furman Kemp and Vernon Freeman Marsters.

No. 108. A Geological Reconnoissance in Central Washington. By Israel Cook Russell.

The region traversed embraced about 10,000 square miles, in the arid district east of the Cascade Mountains, with drainage to the Columbia River. The reconnoissance was undertaken for the purpose of ascertaining to what extent the conditions favoured the project of obtaining water by means of artesian wells; and the general conclusion is unfavourable to the project. The principal formation in Central Washington is a series of lava sheets, which extends south into Oregon and California and east into Idaho. This sheet, it is thought, covers not less than 200,000 square miles to an average depth of about 2,000 feet.

No. 109. The Eruptive and Sedimentary Rocks on Pigeon Point, Minnesota, and their contact phenomena. By William Shirley Bayley.

No. 110. The Paleozoic Section in the Vicinity of Three Forks, Montana. By Albert Charles Peale, with Petrographic Notes by George Perkins Merrill.

No. 111. Geology of the Big Stone Gap Coal Field of Virginia and Kentucky. By Marius R. Campbell.

Nos. 112 and 114. Earthquakes in California in 1892 and 1893. By Charles D. Perrine, of the Lick Observatory.

These lists contain records of the shocks observed or felt on Mount Hamilton and all those reported to the Lick Observatory by letter, as well as newspaper reports of earthquakes occurring in the State in 1892 and 1893. Mr. Perrine has added also, though on what principle it does not clearly appear, some twenty reports of earthquakes in Oregon, Washington, New Mexico, Chile, Mexico and Alaska, besides a long account of an explosion of a powder mill near San Francisco, and another of a volcanic eruption in the Aleutian Islands. There is in many of the reports an evident desire to make the most of the occasion, and this does not add to the value of the record.

No. 113. Report of Work done in the Division of Chemistry during the Fiscal Years 1891–'92 and 1892–'93.

Three Geographic Dictionaries—No. 115, of Rhode Island, No. 116, of Massachusetts and No. 117, of Connecticut—close the list. These dictionaries, the work of Mr. Henry Gannett, are designed to aid in finding any geographic feature marked upon the atlas sheets of the respective States published by the U. S. Geological Survey; and no other. Even with this limitation, the dictionaries will be found very useful for reference; that of Connecticut, for instance, giving nearly 2,000 names of towns, villages, rivers, brooks, hills and mountains, and, for the last two, the altitudes.

THE DURATION OF NIAGARA FALLS was the subject of a paper read before the American Association for the Advancement of Science, last August, by Dr. J. W. Spencer,* whose method of determining the age of the falls is by the application of the mechanics of the river to the various conditions in the changing episodes of its history.

This method he claims as in a large measure his own discovery, made during the last fifteen years; and, according to him, it differs from that of other writers who have simply divided the length of the chasm excavated by the retreating falls by the imagined, or measured, rate of the recession of the cataract.

An approximately correct estimate was made by Lyell upon a conjecture of the rate of recession now known, as Dr. Spencer says, to be wholly erroneous. He adds that several writers within the past eight years have been using corrected coëfficients of retreat, and yet with results more inaccurate than the guesses made nearly a hundred years ago.

This may be called a discouraging state of things;

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* See *Abstract* by the author, in the *American Naturalist* for October, 1894.

but Dr. Spencer comes to the rescue and sets forth the episodes of the river :

1st. Water descending 200 feet, volume 3-11 of the present, chasm excavated, 11,000 feet ; *Time*, 17,200 years.

2d. Descent of the river in three cascades, aggregating 420 feet, with only the Erie drainage during a recession of 3,000 feet, and with the present volume for a recession of 7,000 feet ; *Time*, 10,000 years.

3d. River descending 420 feet in one cascade, with the present volume, recession, 4,000 feet ; *Time*, 800 years.

4th. Water descending, for the most part, 320 feet, recession, 11,500 feet ; *Time*, 3,000 years.

The age of the Falls, by this computation, is 31,000 years ; to which Dr. Spencer adds 1,000 years for the time during which the river flowed from lake to lake without a fall.

It is further estimated, he says, that, with the earth movements continuing as at present, the end of the Falls will be effected by the change of the drainage from the Niagara River to the Mississippi by way of Chicago, through the rise of the eastern rim of the Erie basin above the barrier which now separates the lake waters from those which find their issue in the Gulf of Mexico ; and the future life of the Niagara River ought to be 5,000 or 6,000 years.

The time is short, but we know the worst, and there is comfort in the reduction of Lyell's 35,000 years to 32,000.

A LETTER FROM MR. PEARY BY ESKIMO MAIL.—The following extract from the London *Times*, of

November 22, shows that the Eskimo mail-carrier may be trusted :

> The whaler *Eclipse*, which arrived at Dundee yesterday from Davis Strait, brings a letter from Lieutenant Peary, of the American Arctic expedition. The letter, which is dated Cape York, May 29, says :
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> "Although it is very likely a ship will come to my headquarters this summer, I still take advantage of this opportunity of communicating with the world. I have completed a successful search for the meteoric stones mentioned by Captain John Ross in 1818, and start north to Whale Sound to-night. Hugh Lee is my companion. My party is in good condition. The long journey northward over the ice was terminated by a terrible storm, with the thermometer 50 deg. below zero, which froze a number of my dogs and temporarily disabled some of my party, necessitating my return, after penetrating into the interior 124 miles. I shall repeat the attempt next spring. If, on your arrival home next fall, no news has been received in regard to my party, please transmit this letter to the nearest United States Consul, who will cable it to New York. Yours very truly, R. E. PEARY."
>
> The party of Eskimo who delivered the letter to the captain of the *Eclipse*, stated that Lieutenant Peary's party had suffered greatly from frost-bite, and that the long homeward journey from the interior was accomplished amid much suffering and difficulty.

IMMIGRATION INTO THE ARGENTINE REPUBLIC.—The *Anuario* of the Argentine Statistical Department for the year 1893 presents a table showing the foreign immigration for the past 37 years, exclusive of that received by way of Montevideo. The total number of immigrants was 1,407,057.

Of these 855,293 were Italians, 246,405 Spaniards, 143,678 French, 30,796 English, 24,411 Austrians, 21,864 Swiss, 21,506 Germans, 17,693 Belgians, and 45,411 not specified.

The number of arrivals for the year 1857—the first on the list—was 4,951. In 1888 the number was 130,271, and in 1889, 218,744, the highest on record. From this it sank in 1890 to 77,815, and in 1891 to 28,266. It increased in 1892 to 39,973, and in 1893 to 53,067.

The average for the 37 years is 38,028.

The population of the Republic at the end of the year 1892 was 4,257,000.

THE FORMER STUDENTS OF PROF. GUIDO CORA of Turin, celebrated his birthday, December 20, by presenting him with a memorial collection of portraits, drawings, written sentiments and autographs, contributed by his friends throughout the world, in recognition of his labours in the foundation and unaided production of his geographical journal, *Cosmos*, now 21 years of age.

For the benefit of those residing at a great distance from Turin, Prof. Paul Revelli, 12 Via Galliari, announces that contributions to the testimonial may be sent to him up to March 31, 1895.

KOLGUEV ISLAND.—Mr. Trevor-Battye, who with one companion, Thos. Hyland, visited Kolguev Island last summer to make collections in ornithology, arrived at Archangel early in November on his return, and sent an account of his experiences to the London *Times*. He landed on the northwest coast, at the mouth of the Gusina River, June 21, and set out to cross the island, over bogs and through ravines filled with snow. The weather was alternately cold and foggy, or extremely hot, when the air swarmed with mosquitoes. Birds abounded. After a week the travellers reached a camp of Samoyeds, with their reindeer, and stayed with them till August 20. During this time a Russian trader arrived, who had visited the island for 35 successive years. With this trader the Englishmen sailed for the mainland on the 18th of September, and landed, after struggling with rough weather, at Oksina, on the Petchora River. Oksina is the centre of the Samoyed trade, and the traders send their sons into the *tundra* to be brought up as Samoyeds, a practical if not an ideal kind of education. From this place, until the Dwina was reached about 70 miles above Archangel, the journey was one continuous floundering through marshes and across half-frozen streams.

Concerning the structure of Kolguev and its climate Mr. Trevor-Battye writes :

> I was unable to find any primitive rock, either limestone or granite, or any continuity of *strata*. It is simply fluviatile deposit, and I have no doubt is part of the delta of the great palæozoic river, of which, possibly, the Petschora is a survival. Everywhere, under the action of frost, ice, water and waves, the land is being denuded, broken down and built up again. Every river but one has a bar at its mouth and is exceedingly shallow. There is a good anchorage in the big southeastern gulf, except during northeasterly winds. The Waskina River formerly entered this gulf, but does so no longer. The shore line marked on the chart does not exist. The temperature, as compared with that of the mainland, is exceedingly low. The thermometer in the sun in July only once reached 70 deg. Fahrenheit at midday. This was on July 6, and it fell to freezing point at midnight. We had constant northerly gales, one of which lasted 84 hours.

BARON VON TOLL'S SIBERIAN EXPEDITION.*—In 1889 the St. Petersburg Academy of Sciences received information that the entire body of a mammoth had been discovered on the bank of the river Balakhna, near Khátanga Bay, in about 73° N. Lat.

The Academy selected Baron E. von Toll to lead an expedition to secure the mammoth, and also to explore the unknown region of the upper Khátanga River and the Anábar. The execution of the plan was delayed by the leader's serious illness, and it was not till December 25, 1892, that von Toll started from St. Petersburg in company with Lieut. Eugene Shileiko, of the Russian Navy.

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* Petermanns Mitteilungen, 40 Band, 1894, VI–VII.

Two months later, February 23, they arrived at Yakutsk, on the Lena; and on the 9th of March they began their journey to the north. After crossing the Aldan, the most northerly considerable affluent of the Lena on the right, the travellers drove in their reindeer sleds through the picturesque Tukulan valley, where the poplar forests were unexpectedly fine, to the base of the Verkhoyansk Mountains, which they crossed by the steep Tukulan Pass, at an elevation of 4,900 feet, and descended into the valley of the Yana. At Verkhoyansk (the coldest known spot in the northern hemisphere) they turned in a north-northwesterly direction to the Bytantai River,* and thence to the north across the Omoloi Mountains into the *tundra*, at 70° 30′ N. Lat. Crossing the tundra in a direction east by north, they came again upon the Yana valley and the limit of the forest at the village of Kasatche, which Baron von Toll had visited in 1885–86 with Dr. Bunge, and where he now found two of his former guides.

Conversation with these experienced men convinced von Toll that he might extend the purpose of his journey so as to enable Lieut. Shileiko to renew and to complete the astronomical determinations and magnetic observations made by Anjou in 1821–24. After the Easter holidays von Toll set out, with Mr. Sannikov, for the place where the mammoth was said to have been found on the Sanga-ur-akh River, about 170 miles to the northeast of Kasatche. They reached the spot on the 16th of April, and began digging without loss of time, but found only some scattered bones and a shattered skull, from which the tusks had evidently been broken many years before. Sannikov, however, still hoped that, with the melting of the snow in the summer, he would succeed in finding the hoped-for prize.

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* It was on a branch of this river, the Khalbui, that a perfectly preserved carcass of a rhinoceros was found, in 1877.

Before the expedition left St. Petersburg, Baron von Toll had received a letter from Nansen asking his aid in procuring two teams of good Siberian draught-dogs. Not satisfied with what he had done to meet Nansen's wishes, von Toll conceived the idea of establishing depots on the New Siberia Islands, to meet the possible case of disaster overtaking the *Fram.* He spoke of the plan to Mr. Nicholas Kelch, of Irkutsk, who entered into it with heartiness, and furnished 1,500 rubles towards its accomplishment. All preparations having been successfully carried out, von Toll and Lieut. Shileiko, with their Cossack interpreter and three Lamuts, started in dog-sledges to cross the frozen sea to the New Siberia Islands on the 19th of April. The Lamuts, who were at home with reindeer, knew nothing about managing dogs, and there were many humorous mishaps before the party landed on Liakhov Island. Eight days later they reached the southern point of Kotelni Island, where von Toll had built a winter hut in 1886. This they found filled with snow, and the task of clearing it fell upon the three Europeans, the Lamuts being of no use for the work. Once cleared and put in order, the provisions were stored for Nansen.

One of the Lamuts was left here, and the rest of the party started around the coast for the north end of the island. At this place, Stan Durnova, 75° 37′ N. Lat., the other depot was made in this fashion: a deep hole was dug in the constantly-frozen soil, and the leather-covered cases of provisions were laid in it; these were covered with planks, and earth was then shovelled in; on this water was poured, to freeze, then more earth, then more water, and so on, till the hole was filled. A stout enclosure was built around it and filled with earth, and on the top of this was planted a high signal.

On the 7th of May the return began, and at Cape Chukotski a heavy snow-storm detained the party three days. When the snow ceased, the first summer visitors appeared in the silver gulls, and signs of life multiplied. On the 11th of May a pair of gray geese and the beautiful males of the king-duck (somateria spectabilis) were seen, and when the party left Kotelni on the 18th, the sweet note of the sand-piper (Tringa islandica) was audible. The birds of prey were feasting on the lemmings, the only winter inhabitants of the island, now migrating to and from the mainland, and Lieut. Shileiko shot a polar bear that had fattened on the same food.

The swift advance of summer made the crossing from the island a slow and toilsome process. The dogs gave out in the soft snow and the men had to drag the sledges; but they landed at Svatoi Noss on the 27th of May in good health. All the streams were running full with the melting snow. Here began the second part of the journey; and, mounted on reindeer, which they found waiting for them, von Toll and his companion turned their faces to the west and followed the line of the coast.

At Kasatche the caravan separated and followed two roads to the Lena, which von Toll reached at Bulun on the 12th of July, while Lieut. Shileiko, taking a more northerly route across the Kharaulach Mountains, came on the river at Kumaksur. According to Baron von Toll, his own ride of 800 miles across the tundra was one that might be performed at any time of the year on a good reindeer, if the traveller took with him a *vetka* (the hollowed trunk of a poplar) or three boards in the shape of a trough, on which to cross the streams.

Some anomalies in climate were remarked. On the 14th of July, in 71° N. Lat., on the tundra and near the Arctic, the thermometer in the shade marked + 27° Cent. (81° Fahr.). In the sun the mercury went up to + 39° 3 C. (102° Fahr.). In three weeks thunder was heard three times, but at a great distance, and without rain; and none fell for a whole month. The swarms of gnats brought out by this dry heat terribly annoyed Lieut. Shileiko, while making his observations; and the tundra moss took fire.

At Bulun von Toll went on board the steamer *Lena*, and joined his companion at Kumaksur, where they took a boat and descended the river to the delta. The great stream flows between banks 1,000 feet in height, with stretches seven or eight miles long where no landing-place can be found in the wall of naked rock, for refuge in case of a squall. Threading their way through the mazes of the delta, the voyagers landed on the Arctic coast on the 1st of August.

The dwellers in the delta build their *yurts*, or huts, wherever they halt to hunt or to fish; so that these huts are ten times as numerous as the families they shelter.

August 3, the reindeer were mounted again for a 70-mile ride to Bolkalak on the left bank of the Olenék, not far from its mouth. While Lieut. Shileiko was busied with his observations, von Toll made excursions in the neighbourhood, and on one of these found the graves of Lieut. Prontschichev and his wife, who died near the mouth of the Olenék in 1737. The wooden enclosures were still sound, and the inscriptions on the half-broken crosses were partly legible.

From Bolkalak the journey was continued to the west by daily stages of 20 miles. The summer was far advanced, and the few birds observed were belated stragglers of the flocks that had passed to the south, and the travellers began to fear that the winter would overtake them; but from the time they reached the mouth of the Anábar, August 21, to the 22d of September, they enjoyed wonderfully soft Indian summer weather.* At the Anábar, on the 18th of September, the companions separated once more; von Toll turning back to Bulun to get together the New Siberia collections, while Shileiko remained to complete his work on the Anábar, and then to go by sled to Khatangskoi, where von Toll expected to meet him in the beginning of November.

Winter came on the 22d of September, with a heavy fall of snow, and the saddle was exchanged for the sled. On the 24th, the mouth of the Olenék was reached, and there von Toll found his Lena River boatman, Torgersen, who had spent more than a month watching for Nansen's vessel; but nothing had been seen of the *Fram.*

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* Altweibersommer.

At Bulun, where he arrived October 4, von Toll remained ten days, and then started westward, travelling with great speed well into the night, thanks to the northern lights, which shone through the veil of cloud with an effect like that of the electric lamp through a white globe. It was now deep winter, with a temperature of 44 degrees below zero, Fahr., and on the watershed between the Anábar and the Popigai, altogether bare of trees, the snow storms often kept the travellers in their tents.

Lieut. Shileiko was found at Khatangskoi on the 4th of November. The country between Anábar and Khatanga, traversed and laid down in this journey, was previously unknown.

The homeward route was along the forest limit and across the last tundra, between the Piasina and the Yenisei. Yeniseisk was reached on the 22d of November, and December 27 found the explorers safe in St. Petersburg. In 367 days they had travelled 17,000 miles, of which 2,800 represent their explorations, without counting Lieut. Shileiko's 400 surveys. The route of exploration is based on 38 astronomically determined points, for which magnetic observations were also made; and the collections in geology, botany, ethnography and zoology are very rich.

The region explored lies in the East-Siberian governments of Yakutsk and Yeniseisk, in the districts of Verkhoyansk and Turukhansk, a region where the soil is constantly frozen ; and through the middle flows the Lena, the grandest river of Siberia. Where this receives the Aldan, in 63° N. Lat., its right bank rests on the Verkhoyansk chain, which stretches away in a line slightly curved like an S*, to the Arctic, sinking gradually as it approaches the sea, from 7,000 feet at the source of the Indigirka, to 5,500 where the Yana rises, and at last to 2,800 feet in the Kharaulach Mountains.

On the coast of the Arctic, between the Lena delta and Borkhaia Bay, the mountains are abrupt and steep, and from this point they continue in a northeasterly direction between 73° and 76° N. Lat., to end in the New Siberian group, where the highest peak, Malakatyn, on the Island of Kotelni, is about 1,500 feet above the sea.

The Yana, Indigirka and Kolyma rivers rise on the northern slope of the Verkhoyansk Mountains, which have throughout their extent the same geological structure.

Baron von Toll found on Liakhov Island, under what he calls the rock-ice, the bones of fossil mammals, remains of insects, leaves of the willow and the birch, and entire trees of the alder, from 14 to 20 feet long, with their leaves and cones; and he comes to the conclusion that the mammoth and its congeners were native to the region, and also, that the forest-limit formerly extended to 74° N. Lat., at least three degrees further north than its present line.

The mechanical action of the streams in this region is in a horizontal direction on the surface, owing to the impenetrability of the frozen soil, and not vertical, as in the case of the European rivers; and this fact has its relation to the organic life. The Lamuts assert that the migration of the lemmings takes place every three years; and von Toll finds the following explanation of the phenomenon. All the higher spots of the tundra are honey-combed with a net-work of underground passages, dug by the lemmings to protect them against their numerous enemies. The storms of winter fill these passages with snow, and when the snow melts the surface is broken up so that the ground looks like a freshly-ploughed field. This ruins the vegetation, and the lemmings wander away to new pastures. The period of three years represents the time required for the complete destruction of the vegetation, or for its renewal.

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* The text reads oddly enough: lehnt sich . . . . an das Werchojansker Kettengebirge, das, leicht S-förmig gekrümmt, fast in meridionaler Richtung bis an das Eismeer hinanreicht.

The migration of the wild reindeer is not less interesting. Every year these animals move to the coast in the summer, some of them even crossing to the New Siberian Islands. The hunters lie in wait for them all along the coast, and kill them in the water with spears. In the autumn the reindeer turn back from the Khátanga Gulf and fall into the snares set for them, to the great profit of their human enemies, who are cared for by Nature in a peculiar way, if Baron von Toll is right. As he explains it, the reindeer are driven to migrate by the persecution they suffer from the gnats and gad-flies, and these apparently useless plagues may be rightly regarded as a necessary factor in the economy of Nature.*

Lieut. Shileiko, perhaps, and the reindeer may not see the necessity of the factor.

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* Und man kann daher mit Recht diese scheinbar nutzlosen Plagegeister als einen notwendigen Faktor im Haushalte der Natur ansehen.

Very impressive is the coming of the birds in the death-like stillness of the tundra. They come all at once, with the warm weather, by millions, and the air resounds night and day with the concert of their voices. Yet a few weeks, and the concert is hushed as suddenly as it began. The myriads are busied with the one care of protecting their young from the enemies about them; and only now and then is heard the warning cry of the old bird on the watch.

Migration is the law of life in these regions. All the inhabitants, Yakuts, Tunguses, Lamuts, and even the Russians, are nomads. They move with their reindeer to the sea-shore, and back to the protection afforded by the forest in the winter. Only the Yakuts in the Lena delta remain in the tundra throughout the year.

The Russian settlements are left empty in the time of the summer fishery; and the travelling merchants from Yakutsk come down in September to barter, some with the western, some with the eastern tribes, returning in the spring to embark with their families and all their wealth in furs and mammoth ivory for the voyage of long months on the Lena, back to the Yakutsk for the yearly fair.

Baron von Toll has none but good words for the native Siberians, an honest, simple, kindly race, to be regarded with the affection that men bestow upon children. Like children, also, they have great qualities to be developed; and the famous saying of the Highlanders finds a parallel in this of the Yakuts: " Shoulder to shoulder, to stand and to die for a cause."

KAFIRISTAN.—Mr. G. S. Robertson, C.S.I., who tells his story in the *Geographical Journal* for September, 1894, is the only European who has travelled in Kafiristan. Lockhart's mission, in September, 1885, crossed from Chitral into the Bashgul valley, stayed a few days, and returned to Chitral by another road. McNair, it seems, never entered the real Kafir country.

Mr. Robertson made his first visit in October, 1889, and he spent more than a year in the country.

Kafiristan, the *land of the Infidel*, is a geographical expression used to designate the region inhabited by non-Mohammedan tribes. It is bounded, according to Mr. Robertson, on the east by Chitral and the Kunar valley, on the southeast by the Kunar valley, on the west by Afghanistan, and on the north by the Hindu Kush and by the Badakhshan.

The country consists of a series of main valleys, deep, narrow and tortuous, into which narrower and more difficult valleys and ravines pour their torrent waters. The main valleys are separated from each other by high and rugged hills, and the different tribes are consequently isolated during the winter. The passes leading from Badakhshan are over 15,000 feet in height, and those on the Chitral side, though somewhat lower, are still effectually closed by the snow.

On the lower slopes fruit trees abound, with many shade trees, horse-chestnuts, oaks, wild olives and shrubs of all kinds; while at an elevation of from 5,000 to 9,000 feet there are dense pine and cedar forests. Beyond these grow willows, birches and juniper trees, and above 13,000 feet the only vegetation is rough grasses and mosses.

All the rivers drain into the Kabul, either directly or through the Kunar River; and the roads, such as they are, lie along the river banks, where the traveller has frequently to edge himself on in a sitting posture.

The bridges, sometimes very well built, are high above the water and often not more than eighteen or twenty inches wide in the middle, with parapets a few inches high ; and sometimes they consist of nothing more than a pole or two. In the Presun Valley, however, they are made on the principle of the dug-out boat from large tree-trunks, and are easy and safe.

Mr. Robertson thinks that the people of this strange country are mainly descended from the old Indian population of Eastern Afghanistan, mingled with the aboriginal races of the valleys.

He finds three distinct languages in Kafiristan, besides many dialects.

The tongue spoken by the greatest number is that of the Siah-Posh ; the other two being the Wai, and the speech of the Presun people, which, the Bashgul Kafirs declared, could never be learned by any one. The sound of this Oriental Basque is compared by Mr. Robertson to a soft musical mewing.

The tribe is split up into families or clans, and affairs are arranged by consultation of the headmen, or *jasts*.

The *jast* is appointed after a ceremony, which lasts for more than two years, and must be performed again and again, if the headman wishes to keep his influence.

Physically, the Kafirs are lightly built, vigorous men, who seem to be in hard training. Fat men are unknown. In talking with a priest, Mr. Robertson explained how common corpulence was in England. " I know very well what you mean," said the priest ; " I once killed a very fine man on the Asmar frontier, and he was fat just as you describe."

The average height of the men is five and a half feet. The women are of low stature and weakly in appearance, but of wonderful endurance.

The people are extremely jealous and covetous, and they keep up the bitterest intertribal hatreds. Their mental powers are considerable. Mr. Robertson took with him to India a boy of a somewhat degraded type, and paid him 280 Indian rupees for his services. The boy asked to have the equivalent in Kabul rupees; the rupee of India representing sixteen, and that of Kabul twelve and a half annas. Mr. Robertson figured out the sum, but the boy proved that the calculation was wrong, counting by his fingers and toes.

On another occasion Mr. Robertson had forgotten the arrangement of letters by which he opened a puzzle lock. He showed the lock to a Kafir, who had never before seen a printed letter. The man found the combination and never forgot it.

The Kafir religion is idolatry, with traces of ancestor-worship. Imra is the creator of all things; and there are many secondary deities, the most popular being Gish, the war-god, who was miraculously created. He is said to have killed Hasan and Husein, the grandsons of Mohammed. Gish has shrines in every village; his image being either a plain stone, or a wooden head and face, and war-trophies are frequently set on poles at the corners of his temples.

The Kafirs believe also in fairies and in devils; and in a hell under ground where wicked people burn. The spirit of a dead man becomes a shade, or phantom.

The most sacred place in the world is Kashmir, because it was the first created country, and from it the world was populated by a dispersion like that which followed upon the building of the tower of Babel.

A number of the children of Father Adam and his wife were asleep together; and when they waked in the morning a confusion of tongues had come upon them, so that each man could understand only one particular woman, and the couples wandered away in different directions.

Though the Kafirs do not admit that they worship their ancestors, the wooden or stone erections to the memory of the dead are often sprinkled with the blood of sacrifices. All the worship is by sacrifices, dances or sacred songs; and there is nothing like prayer.

The dead are neither buried nor burned. The bodies are placed in large boxes on the hillside, or in some secluded spot; and in some cases close to the village and by the roadside. The boxes are very large and are used till they are filled, or as long as they hold together. Only in rare instances is there much ceremonial about the funeral. Two young men were killed in an expedition. Their heads were brought to their village by a friendly tribe and were received by a crowd of mourning women, and at the same time the fathers of the boys threw themselves from the housetop. Straw figures were attached to the heads, and they were then taken to the dancing-platform, where orations, dances and mourning went on for two or three days, while food and wine were distributed to the company. Then the heads were taken to the cemetery, and the observances went on with the straw figures.

There are no blood-feuds, but if a Kafir kill one of his tribe he must leave his village and become an outcast. His house is burned and his property is plundered; and his descendants must bear the stigma of his crime. The slayer flees to one of the recognized cities of refuge and remains there.

Marriage customs are simple. A man who wishes to marry sends a friend to ask the price of the bride. If he is poor, he is asked to pay eight cows; if rich, as many as twelve or sixteen. If the father accepts the price, the man goes to the woman's home, where a goat is sacrificed, and the ceremony is over; but the woman remains in her father's house till the price is paid.

Polygamy prevails; and after a man's death his wives may be sold or retained by his brothers.

Mr. Robertson praises the courage and independent spirit of the Kafirs, as well as their strong family affection, and their devotion to one another in war. They are boastful and splendidly mendacious, yet far more truthful and honourable than their immediate neighbours. This is bad for the neighbours; and the whole story becomes a dark saying when Mr. Robertson adds:

> Most of the early information given me was false from beginning to end, and I still grudge the labour involved in recording it.

L'AFRIQUE EXPLORÉE ET CIVILISÉE.—Messrs. Georg et Cie., Geneva, the publishers of this excellent periodical, announce its cessation with the number for August, 1894; the impaired health of the editor, Mr. Charles Faure, no longer permitting him to continue the work so ably and so conscientiously performed, from month to month, for the past fifteen years.

M. Faure, it should be said in bidding him farewell, was always true to principle. He sympathized with the daring and the energy of the Europeans, but he never forgot that the Africans had rights, nor failed to expose and to denounce the wrong done in the sacred name of civilization.

THREE YEARS IN MOROCCO.—M. Gabriel Delbrel left France for Algeria, in the autumn of 1890, to fit himself by the study of Arabic for a journey into Morocco. He was then 18 years of age. At Tlemcen he made the acquaintance of a prominent trader, who gave him letters of recommendation to the chiefs of the Angad tribes on the frontier of Morocco.

Wearing the Arab dress, but not concealing his nationality, he was well received at Udjda, and visited the region of the Chotts, or salt lakes, and the Dahra. Falling under suspicion in one place, he assumed the character of a Turk, and was careful thereafter to observe the practices of the Mohammedan religion. Detained for several months among the Angad by intertribal quarrels, he set out in November, 1891, with the kaïd Hameda-el-Buzegawi for the City of Fez. There he found his way, in the train of the kaïd, into the presence of the Sultan. On his way back to Algeria he fell sick and was arrested by one of the sons of the Sultan. He succeeded in escaping to the Beni-M'ter, Berbers dwelling between Fez and the chain of the Middle Atlas. These Berbers were ordered to join the Sultan's force moving against Tafilelt, and Delbrel accompanied his protectors.

He was denounced and brought before the Sultan, but was spared at the intercession of Muley-Abdul-Aziz, who is now the ruler of Morocco.

Delbrel acquired the friendship of the young prince, to whom he gave lessons in drawing, and was allowed to move about the country without being greatly annoyed. His stay in the Tafilelt was from the 10th to the 19th of November, 1893. As a captive under surveillance, he followed the Sultan's army to the City of Morocco, and there determined to make his escape. He started in the night of December 31, and after a forced march of 2½ days reached Mazagan, where he took refuge with the French consul. There was no time to lose. The Sultan had sent out horsemen in pursuit of the fugitive, and the day after his arrival agents were searching the town for him. Men were posted at the gate leading to the water-side to intercept Delbrel on his way to the steamer; but he had changed his Arab costume for a European dress and embarked in safety on the 8th of January. On the 16th he reached Marseilles.

M. Delbrel was not a trained explorer. His instruments were a compass and a chronometer, and his ready pencil; and with these he made the best possible use of his opportunities, as appears from the map of his route, the plan of Tafilelt and the sketches, which accompany the text of his *Notes* in the *Bulletin* of the Paris Geographical Society, for the second Quarter of 1894. He is one of the three Europeans who have seen the oasis of Tafilelt. René Caillié passed a few days in the place in 1828; and in 1862 Gerhard Rolfs resided there for a month, and his account is still the principal source of information.* Tafilelt is the cradle of the dynasty that reigns in Morocco, and the place of exile for the members of the imperial family. It is situated in 31° N. Lat., and between 4° and 5° W. Long. M. Delbrel determined its altitude at 600 metres (1,968 feet), with the help of a barometer belonging to an officer in the service of the Sultan.

Tafilelt is an unhealthy place on account of the great difference between the temperature of the day and that of the night. In November, 1893, the temperature at noon, in the shade, was from 35° to 40° Cent. (95° to 104° Fahr.), and it sank, between midnight and 2 A.M., to 1° Cent. (30° Fahr.). The supply of water is scanty and most of the wells are brackish. Some few of the *Ksur*, or fortified villages, possess wells of sweet water.

There are no roads but the footpaths, and these are difficult and perilous in the mountains.

The population numbers about 45,000, composed of the Cheurfa Moulaï-Ali, or imperial exiles, the Filâla, who form the majority, the husbandmen and the Arab traders, and the Jews, who number 300 or 400 and live in a special village.

The Cheurfa are the nobles of the oasis. They receive an annual pension from the Sultan, and pass their time in fighting each other.

The Filala hunt and till the ground. They are generally tall and thin, very hardy and active. One, whom M. Delbrel saw at Fez in 1892, travelled as a courier from Fez to Udjda in four days, a journey of five days for men on horseback.

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* To these names must now be added that of Mr. Walter B. Harris, who started from Morocco on the 1st November, 1893, and visited Tafilelt not long after M. Delbrel. He described his journey at a meeting of the Royal Geographical Society in November, 1894.

Like the Cheurfa, they are continually quarrelling among themselves. They are fanatical and detest the Christians; and their violent temper seems to be due in some degree to the hemp, which they smoke to excess. They plant chiefly hemp and maize, with squashes, melons and sweet potatoes; and of fruit-trees they have the fig, the apricot, orange, lemon and apple; but their great reliance is on the date-palm, of which there are several varieties. All the available soil is cultivated, but the crops are frequently ruined by drought, or by the locusts.

M. Delbrel noticed that the Filala women, except those of the richer class, went with uncovered faces, contrary to the Mussulman custom. They are good-looking and well made, but they lead a hard life. Marriage is an affair of bargain, and the price of a wife is generally 200 francs paid to the father; though the priest, in the presence of both families, goes through the form of asking the bride, who is with the other women behind a screen, whether she is willing to be the wife of the man who has bought her. The marriage takes place a week after the betrothal, and is celebrated with a *fantasia* and a procession to the home of the new couple.

The leather manufactured in the Tafilelt is a very fine morocco. Besides this, the people make excellent pottery, flint-lock muskets, daggers, saddles, embroidered bags, etc., and very fine basket-work. There is an active trade in all these articles and in the exchange of European products for those of the Sudan; and the place is a great slave-market.

The ordinary dwellings are not much more than huts, built of sun-dried earth, but the *Ksur*, though made of the same material, with the addition of lime, are often imposing structures, with walls six or seven feet thick and thirty-five or forty feet in height, enclosing in an area of a square mile, or more, the residences of forty or fifty families.

The successful issue of a journey so prolonged through regions full of danger bears testimony to M. Delbrel's remarkable intelligence, courage and self-command.

AN ESCAPE FROM THE SUDAN.—Father Paolo Rossignoli, of the Austrian mission at El Obeid, in Kordofan, reached Cairo on the 25th of November, with the guide Abdullah Omar, to whom he owes his escape from Omdurman.

Father Rossignoli was captured with the other members of the mission in 1883. In March last Abdullah Omar signed an agreement with Maj. F. R. Wingate that, for the sum of £300, he would secure the escape of a European prisoner from the power of the Khalifa. He left Cairo March 31, taking with him a visiting card on which Archbishop Sogaro had written in Latin : *To Father Rossignoli.—The time of your deliverance has arrived. Trust in God. Come.*

On the 30th of June Abdullah arrived at Berber, where he was arrested as an Egyptian spy ; but he disarmed suspicion by contracting a marriage and settling in the place. After two months he proceeded to Omdurman, where he found Father Rossignoli living as a servant in a coffee-shop, and communicated with him.

A boatman was engaged to take Father Rossignoli to Berber, in the character of an Egyptian soldier escaping from his creditors; but the other passengers recognized the priest and refused to go with him. Abdullah then bought a camel and two donkeys, and Father Rossignoli, feigning illness, started for Khartum, and hid himself in a ruin near the Nile.

He was joined by Abdallah and they got as far as Metammeh, where they were seized by fifteen soldiers of the Berber garrison; but Abdullah's ready wit saved them. He professed to belong to the Emir of Berber's party.

At Berber, Abdullah was denounced for travelling with a Christian and was brought before the Emir, while search was made for the priest, who succeeded in hiding himself, till Abdullah got free by bribing the Emir. Here the fugitives crossed the Nile, on the 9th of November, and travelled night and day till they reached Assuan, where they were safe, on the 20th; the emissaries sent in pursuit of them having lost the trail and taken the road to Kassala, now held by the Italians, and assumed therefore to be the priest's destination.

Father Rossignoli reports that the Mahdist movement has been greatly weakened by the Italian capture of Kassala, and that the tyranny of the Khalifa has made him very unpopular. None the less, he keeps up the garrisons at El Obeid, Dongola and other places, and he has gathered a force to recover Kassala. There will be three armies; one under Osman Digna will move from Gos Redjib, which is northwest of Kassala ; the other two from El Fasher and Geddaref, both lying to the southwest. The total Dervish force is estimated at 15,000 men.

Dr. Donaldson Smith, of Philadelphia, who left Berbera with a caravan last summer for Lake Rudolf, was heard from in November. He reached early in September a point in 7° 11′ N. Lat. and 42° 11′ E. Long., almost half-way to the lake. He made a running survey of the unmapped country through which he passed, and followed for a week the course of a great river, which he believes to be the Erer and an affluent of, or identical with, the Webi Shebeli.

At the end of the week, being still unable to cross the river, he retraced his steps and at last discovered a ford, which was crossed with difficulty.

The country was thinly populated, partly through the wars between the Gallas and the Ogadins, but partly, no doubt, because the tribes are nomadic in their habits.

Dr. Smith's party was in good health, and he had made large collections in natural history.

German East Africa.—Letters from Count von Götzen, printed in the *Verhandlungen** of the Berlin Geographical Society, record some interesting discoveries in German East Africa.

In the volcanic region of the Gurui Mountain, midway between Bagamoyo and the Victoria Nyanza, von Götzen climbed through primeval forest to the principal ridge of one mountain. This ridge, between 2 and 3 miles long and 2 to 2½ in width, rose to a height of 9,500 feet, with a peak at least 1,000 feet higher. Thick reed-grass and heath covered the sides, and among these grew Alpine violets, forget-me-nots and rhododendrons; and there were many tracks of rhinoceroses and elephants.

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* Band XXI, No. 6 and No. 8.

The ravines were very steep. Looking to the southwest von Götzen saw a great lake, to which one of his men, who had travelled with Stuhlmann, gave the name of the Umburre Lake. It lies to the northeastward of Stuhlmann's route to Irangi; and von Götzen was assured that it never dried up, and that the people on its shores navigated it in boats. It was said to swarm with hippopotami; and near it was a country called Niarasa Land.

On the 3d of February, 1894, while on the upper course of the Bubu River, on the Uasi Mountains, to the north of Irangi, an uncommonly severe earthquake was felt. It lasted about 20 seconds, and the direction was S.S.W. to N.N.E.

At the beginning of May the explorer crossed the Kagera-Nile, about where Stanley places his Mt. Observation in the map of *In Darkest Africa,* and marched to the Virunga Mountains. The native names of the cones, taken in succession from east to west, are: Ufûmbiro, Vihunga, Karisimbi, Navúnge and Kirunga tsha gongo (place of sacrifice), which was evidently an active volcano. To reach this it was necessary to cross at two points the Niavarongo, the largest source of the Kagera. It rises on the eastern edge of the Central-African trough, makes a great bend almost to the Virunga volcano, and unites with a smaller river, the Akenyara. Von Götzen approached the Kirunga tsha gongo from the south and climbed to the top, after toiling through the woods for three days.

The edge of the principal crater, which is of imposing character, is at an elevation of 11,220 feet. Standing on the brink, one looks across an amphitheatre of a mile in diameter, with walls sloping at an angle of eighty degrees, 1,000 feet down to the level floor, yellowish-brown in colour. In the floor are two shafts, as regular as if shaped by the hand of man, and from that to the north, the diameter of which may be from 300 to 500 feet, pours forth vapour, red with reflected light, and accompanied at irregular intervals by a sound like thunder. These are signs of the lava below; and von Götzen concluded from the glimmer visible on the western edge of the mountain that another centre of eruption existed in that direction; but he was unable to reach the place through the dense forest.

Near the foot of the Kirunga tsha gongo lies Lake Kivu, from which the Rusisi River flows into Tanganika. Kivu is at an elevation of 4,920 feet. It is not much smaller than Lake Albert Edward; von Götzen encamped at its northern extremity and it looked like the sea.

Though the weather was clear, nothing could be seen of the southern or the western shore, and strong breakers rolled against the lava-cliffs.

The western side is subject to the King of Ruanda, and his elephant-hunters, the Batura, are well-grown people, without a dwarf among them. In East-Ruanda the explorer passed another lake, called Mohasi, between 35 and 50 miles in length, and from a mile and a quarter to three miles wide.

The northern extremity of this lake occupies the spot where Kisege stands in Stuhlmann's ethnographic map, published in October, 1893; and the extension of the lake is towards the south-east.

Count von Götzen's second letter, written from the Kivu Lake on the 18th of June last, closes with the remark that Lakes Oso and Kivu may very well form one body of water. Since that time he has pushed his exploration, as appears by the following telegram from Matadi, on the lower Congo, received by the Berlin Geographical Society on the 8th of December:

> I reached Matadi *via* Ruanda through the primeval forest and along the Lowa. Volcano in action. Kivu large. Oso River.

The supposed lake proves to be a river, and this makes a record of three important discoveries for this latest march across Africa.

EXPLORATION ON THE CONGO.—Mr. Mohun, U. S. Consul in the Congo State, reported in the *Mouvement Géographique*, of Sept. 30, the results of his exploration of the River Congo from Kasongo to the confluence with the Lukuga.

This length of about 80 miles was previously unknown. It proved to be an almost unbroken succession of rapids, as far as Kongola, two days' navigation below the mouth of the Lukuga. In the Mesi rapid one of the boats capsized and six men were drowned. The width of the river varies greatly, from 2,500 metres (1½ miles) between Mutabelli and Sanga, to 90 metres (320 feet) between Kongola and Lenga. This gorge is very picturesque, and at one point (lat. 5° 8′), to which Mr. Mohun gave the name of Hell Gate, the stream, 600 feet wide, rushes between a hill 400 feet high on the right and a black granite cliff on the left, while two quartz monoliths, nearly 100 feet in height, divide the roaring waters into three channels. From the mouth of the Luama to Kongola the river valley is narrow and shut in, on the east and the west, by hills that rise here and there to the dignity of mountains. To one of these, on the east, 3,100 feet in height, Mr. Mohun gave the name of Mt. Dhanis, in honour of the commander of the Manyema expedition, and to another, 4,350 feet high, on the left bank, that of Mt. Cleveland, in honour of President Cleveland.

Above Kongola the valley widens, the rapids cease, and the river broadens into two lagoons or pools which are, perhaps, the Lake Langi of the Arabs, though Mr. Mohun nowhere met with this name.

The river is very low in January and February. It begins to rise in March, and at Hell Gate, in the four weeks from March 18 to April 15, the waters rose $4^{\cdot 50}$ metres (14 feet, 9 inches).

The soil of the valley is extremely rich, and well cultivated by a dense population, belonging to the Barua.

EXPLORATION IN THE NIAM-NIAM COUNTRY.—M. de la Kéthulle de Ryhove, a Belgian officer in the service of the Congo State, returned to Brussels in November last from a sojourn of more than three years in the Niam-Niam country, between the Welle River and the frontier of Darfur.

From Yakoma he ascended the Mbomu River to its confluence with the Shinko at Sandu, where he received a visit from the King Rafay, one of the two most powerful chiefs of the Niam-Niam, the other being Semio.

Rafay formerly served under the orders of Lupton Bey, Egyptian governor of the Bahr-el-Ghazal province, and is now about 35 years of age. He has a strong force of soldiers armed with modern improved muskets, captured from the Mahdists. He received M. de la Kéthulle with cordiality, and placed his country under the protection of the Congo State; and he accompanied the Belgian officer in an exploration of the Shinko River as far as 6° 30′ N. Lat., where a military post was established at Sango.

Returning to the point of departure, M. de la Kéthulle then started to explore and take possession of the country, to the north-west, and north. He reached the territory of the Kreishe, a tribe previously unknown, made treaties with their chiefs and founded a post at Bandassi, on the Kpakpe River (the upper course of the Shinko) in N. Lat. 7° 20′. He then crossed the watershed between the basins of the Congo and the Nile, explored the source of the Ada (the upper stream of the Bahr-el-Arab), established a post upon it in Lat. 8° 40′, and sent a company of soldiers to occupy, to the north, the important mining centre of Hofrah-en-Nahas (the copper town).

He was now 400 miles north of the Welle River, in a region to which but one European had penetrated before him.* The Arabs of Wadai offered to escort him and his force to Lake Tchad, and friendly messages were sent to him by the Sultan of Darfur; but he decided to turn back, having almost reached the northern boundary of the Congo State as laid down in the convention with Great Britain, and since abandoned.

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* Dr. Potagos, the Greek traveller, who crossed the Ada near its source, in 1876, and pushed to a spot designated as Zeriba Nur, in the Shari basin, E. Long. 23° 10′, N. Lat. 9° 20′.